Paper for Mayor's Green Building Task Force
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November 26, 2003

Renewable Energy Generation: The Benefits and Barriers

As the Mayor's Green Building Task Force investigates the barriers facing green buildings, Mass Energy would encourage the task force to specifically look at the benefits and barriers to onsite renewable energy generation in Boston.

Our current electric system relies on large, centrally located power plants and a complex distribution and transmission system. In Boston, more than 90% of our power comes from fossil fuels and nuclear power plants, which pollute our air, water and land. The electric grid which carries the electricity from the power plants to homes and buildings is grossly inefficient. Approximately 10% of the electricity that is generated is lost in distribution, and the transmission losses are even greater. Concern is also mounting over the reliability and the security of the system. As we have seen, when the entire Northeast relies on just a handful of power plants, failure or damage to just one plant or one part of the transmission system can have far-reaching impacts. In Boston, congestion remains a significant problem. This is in large part due to the import of power, as much more electricity is needed in the Boston area than is produced here.

Onsite energy generation, also known as distributed generation or DG, offers power options that can be cleaner, more efficient, and more secure alternatives to our current energy system. In addition, DG can be sited specifically to relieve overburdened, congested areas of the distribution system.

In an effort to move toward a more sustainable electric system, the USGBC encourages the use of onsite renewable energy generation in green buildings. The LEED rating system affords 1 point to buildings that supply 5% of their electric load and 2 points to buildings that supply 10% of their electric load using on-site renewable energy systems. In Massachusetts, on-site renewable energy generation is further incentivized by the Mass Technology Collaborative, which only offers grants to green buildings that employ a grid-connected qualifying renewable energy system (qualifying sources include: solar photovoltaics, wind power, fuel cells, hydroelectric, biomass, ocean thermal, wave or tidal energy).

Despite the many benefits of clean DG, there are still a number of barriers that need to be addressed. The cost of these systems is still not competitive with traditional energy sources. Whereas our current electricity supply cost in Massachusetts is approximately $0.04/kWh, solar electricity costs approximately $0.25/kWh and wind, one of the most cost-competitive forms of renewable energy, is still about $.07/kWh. However, the potential benefits of clean DG to the public and the utility transmission system have not yet been accounted for in traditional electricity price structures.

Siting renewable energy generation can also be a challenge. PV panels require solar exposure, wind turbines require particular wind conditions, and hydro facilities require a proximate source of water. The availability of cutting edge renewable technologies is also limiting. Fuel cells, for example, are not yet a product that can be purchased "off the shelf."

Historically in Massachusetts, those who have overcome the above barriers have then faced challenges in the process of interconnecting the DG system with the grid. To date there are no statewide standards set as to how utility companies must manage this process for DG owners.

Proposed installations in parts of Boston face an even greater obstacle. An area network distribution system serves Downtown Boston, the North End, Back Bay and a significant portion of the Fenway neighborhood.

NSTAR strongly resists interconnections of DG in this area, citing concerns that electricity that could back-feed into the network might affect the safety and security of the grid. While there have been no statewide policies on this issue, NSTAR has allowed for interconnections within their radial distribution system (serving areas outside of the downtown network) and have handled requests to interconnect to the area network on a case by case basis, often changing their internal policy. To Mass Energy's knowledge, the only onsite renewable energy generator connected to this area network is the 500 Watt PV system at the New England Aquarium.

In 2002, as a result of its inquiry into distributed generation (DTE 02-38), the Massachusetts Division of Telecommunications and Energy (DTE) established the DG Collaborative to develop statewide standards for the process of interconnection, and to reconcile DG with safety and reliability concerns associated with interconnection. On May 15, 2003 the Collaborative filed with DTE its model interconnection tariff entitled, "Proposed Uniform Standards for Interconnecting Distributed Generation in Massachusetts." According to this process, any application for DG within the downtown network will be handled through a "standard review" process, as opposed to the simplified or expedited processes allowed for interconnection of many technologies to radial distribution systems.

To date the DTE has not ruled on the interconnection tariff filed by the DTE. Mass Energy expects that within weeks the DTE will do so, and the proposed interconnections standards (or something similar) will be adopted as statewide policy. Once this policy is adopted, NSTAR will be required to review all DG interconnection applications. In the case of the standard review process for area network installations, NSTAR will be required provide technical information, cost estimates, and studies if necessary to determine whether the proposed system will impact the reliability and safety of the grid.

Since the establishment of the DG Collaborative, Mass Energy is aware of three applications to NSTAR for the interconnection of PV systems in their area network. One of these is the Morville House, a proposed green building renovation project in the Fenway neighborhood, funded by the MTC Green Buildings Program. When completed, the Morville House will have a new 12 story wing with 146 units of affordable housing for seniors. The architects proposed to mount a 30kW PV system on the southern wall of the building. NSTAR took 3 months to review the application and approved the installation of only 3kW. NSTAR stated in this case that their policy was to allow the interconnection of a system whose maximum capacity is no greater than 15% of the minimum building load (the minimum load typically occurs overnight, when PV system is not producing and there is no chance of backfeeding).

The two other network interconnection applications filed with NSTAR were for 1kW PV demonstration projects on two condo buildings in the Fenway. NSTAR has unofficially rejected these applications, claiming that the pending tariff allows them to deny interconnections in the network.

While NSTAR's technical concerns about DG within the area network are not completely unfounded, their current treatment of DG applications is not acceptable. DG is being installed in network areas throughout the country, with prominent examples in Chicago and New York City. Clearly with unbiased examination of the issues, there are ways to successfully incorporate DG in downtown areas without sacrificing safety and reliability. In many ways, we believe creative solutions exist to actually strengthen the grid's reliability with DG. However, the current barriers put up by NSTAR will all but eliminate the chance of installing onsite generation in downtown Boston, affecting PV, fuel cells, micro-turbines, cogeneration, and wind. The rare project that is approved under the current climate will come only after much time and money has gone into pressing the utility.

If the task force wants to support the installation of onsite generators in downtown Boston, it may be helpful to engage NSTAR in the Green Building Task Force. The GBTF should also stay apprised of the DTE and DG Collaborative's efforts in adopting statewide interconnection standards, as well as the follow up done over the next two years to monitor the implementation of these standards.